***MALE REPRODUCTIVE FUNCTIONS***

**1. SPERMATOGENESIS**

Spermatogenesis is the process by which haploid spermatozoa develop from germ cells in the seminiferous tubules of the testis. This process starts with the mitotic division of the stem cells located close to the basement membrane of the tubules. These cells are called spermatogonial stem cells. The mitotic division of these produces two types of cells. Type A cells replenish the stem cells, and type B cells differentiate into primary spermatocytes. The primary spermatocyte divides meiotically (Meiosis I) into two secondary spermatocytes; each secondary spermatocyte divides into two equal haploid spermatids by Meiosis II. The spermatids are transformed into spermatozoa (sperm) by the process of spermiogenesis. These develop into mature spermatozoa, also known as sperm cells. Thus, the primary spermatocyte gives rise to two cells, the secondary spermatocytes, and the two secondary spermatocytes by their subdivision produce four spermatozoa and four haploid cells.

**2. TESTOSTERONE**

Testosterone belongs to a hormone class called androgens which many times anabolic steroids or steroids. Testosterone is produced in the testicles and some are produced in the adrenal glands. Hypothalamus in the brain and the pituitary gland have the ability to control the production of testosterone. The hypothalamus tells the pituitary gland how much testosterone it is required to produce, and then this message is sent to the testes. All of these communications happen via the hormones as well as chemicals throughout the blood stream.

Testosterone plays a role in the development of the sex organs of a male before birth. It comes back around puberty to impact increased testicle and penis size as well as the growth of body and facial hair. Testosterone plays a huge role in the production of sperm, sex drive, distribution of fat, production of red cells, and muscle mass and strength. Women’s ovaries also produce testosterone but at a very low level.

**3. SEMEN**

Semen, also known as seminal fluid, is an organic fluid that contains spermatozoa. It is secreted by the gonads and other sexual organs of male or hermaphroditic animals and can fertilize the female ovum. In humans, seminal fluid contains several components besides spermatozoa: proteolytic and other enzymes as well as fructose are elements of seminal fluid which promote the survival of spermatozoa, and provide a medium through which they can move or "swim". Semen is produced and originates from the seminal vesicle, which is located in the pelvis. The process that results in the discharge of semen is called ejaculation. Semen is also a form of genetic material. In animals, semen has been collected for cryoconservation. Cryoconservation of animal genetic resources is a practice that calls for the collection of genetic material in efforts for conservation of a particular breed.

**4. MALE ORGASM**

The male orgasm is a complex experience. The major function of the male orgasm is to ejaculate sperm, although not all men will ejaculate during an orgasm. Beyond delivering pleasure, the role of the female orgasm is less clear, although it may help move the sperm closer toward the ovum (egg).

In the 1950s, Alfred Kinsey, the first scientist to study human sexuality in detail, described the orgasm as "an explosive discharge of neuromuscular tension." In the years since those initial studies, we have come closer to understanding both the physiological and emotional components of the male orgasm, as well as the conditions that impede or promote it.

**PHYSIOLOHY**

The male orgasm is a complex system involving multiple hormones, organs, and nerve pathways.

The hormone testosterone, produced in the testicles, plays a central role by enhancing the sexual desire (libido) that leads to arousal, erection, and ultimately orgasm. By contrast, low testosterone not only decreases a man's energy and mood, it makes him less responsive to sexual stimuli, both physical and mental.

With that being said, a man often only requires physical stimulation to achieve arousal, while women typically need physical and mental stimulation to achieve the same.

Men differ from women in that their orgasms—the climax of the sexual response—come on faster and are shorter than women's. By and large, the male orgasm will last for five to 10 seconds. Women will last 10 to 15 seconds on average, although some have reported orgasms that last as long as a minute (a virtual impossibility for men).

The male ejaculate, semen, is comprised of sperm cells and seminal fluid, the latter of which contains phosphorylcholine (an enzyme that aids in fertility) and fructose (which provides fuel for sperm). The average volume of semen expelled by a healthy man is around a teaspoon.

**5. MALE INFERTILITY**

**What is male infertility?**

Infertility is a disease of the reproductive system. It makes a person unable to have children. It can affect a man, a woman, or both. Male infertility means that a man has a problem with his reproductive system. It means you cannot start a pregnancy with your female partner.

**What causes male infertility?**

Natural male reproduction depends on several things.

You must be able to:

Make healthy sperm that can fertilize the egg

Have an erection and ejaculate so the sperm reaches the egg

Problems with either of these may mean you have infertility. Below are some of the main causes of male infertility.

**Sperm disorders**

Problems with making healthy sperm are the most common causes of male infertility. Sperm may be immature, abnormally shaped, or unable to swim. In some cases, you may not have enough sperm. Or you may not make any sperm. This problem may be caused by many different conditions, including:

Infections or inflammatory conditions. One example is infection with the mumps virus after puberty.

Hormone or pituitary gland problems

Immune problems in which you make antibodies against your own sperm

Environmental and lifestyle factors. These include tobacco use, heavy alcohol use, use of marijuana or steroids, or exposure to toxins.

Genetic diseases, such as cystic fibrosis or hemochromatosis

**Structural problems**

Anything that blocks the genital tract can stop the flow of semen. This could be a genetic or birth defect. Infection or inflammation from a sexually transmitted disease can also block semen. Other causes include scar tissue from surgery or twisted, swollen veins in the scrotum.

**Other factors**

Other factors may include erectile dysfunction or premature ejaculation. Liver or kidney disease, or treatment for seizure disorders are examples of problems that can cause infertility.

**What are the symptoms of male infertility?**

You may have male infertility if your female partner has not become pregnant after you have tried for 1 year. This means 1 year of regular sex without any birth control.

Your healthcare provider will test both you and your partner to find the cause of infertility.

**How is male infertility diagnosed?**

Your healthcare provider will review your health history and do a physical exam. Other tests for male infertility may include:

Sperm count (semen analysis). At least 2 semen samples are taken on separate days. Your provider will check the semen and sperm for many things. These include how much semen you make, how uniform it is, and how acidic it is. He or she will also look at how many sperm you make, how well they move, and what shape they are.

Blood tests. Your provider may use blood tests to check hormone levels and rule out other problems.

Other tests. Your provider does these tests to find the cause of sperm defects or health problems of the male reproductive system. For instance, imaging tests like an ultrasound may be used to look at your testicles, blood vessels, and structures inside the scrotum.

Testicular biopsy. If semen analysis shows that you have only a few sperm or no sperm, your provider may remove a small piece of tissue (biopsy) from each testicle. The sample will be checked under a microscope.

**How is male infertility treated?**

Treatment depends on what is causing your infertility.

This treatment involves helping your partner get pregnant. This may be through:

Artificial insemination. This method puts many healthy sperm at the entrance of the cervix or right into the partner's uterus. The sperm can then make their way to the fallopian tubes.

IVF, GIFT, and other techniques. In vitro fertilization (IVF) and gamete intra-fallopian transfer (GIFT) work like artificial insemination. Your provider collects your sperm. Then he or she mixes your partner’s eggs with a lot of high-quality sperm. He or she may mix the eggs and sperm in the lab or in your partner’s fallopian tube.

Intracytoplasmic sperm injection (ICSI). Your provider injects a single sperm into an egg. Fertilization then takes place under a microscope. Your provider puts the fertilized egg in your partn**er’s uterus.**